Water Supply Reserve Account – Grant and Loan Program
Water Activity Summary Sheet
September 11-12, 2014
Agenda Item 13(c)

Applicant: Lower Arkansas Valley Water Conservancy District

Program Sponsor: Lower Arkansas Valley Water Enterprise Fund

Water Activity Name: FIRI Analysis and Tailwater Return Flow Study on Fort Lyon Canal

Water Activity Purpose: Agricultural Study

County: Bent

Drainage Basin: Arkansas

Water Source: Arkansas River

Total Amount Requested: $175,137

Source of Funds: $30,000 Arkansas Basin Account; $145,137 Statewide Account

Matching Funds: Basin Account Match ($30,000) = 17% of total grant request
Basin Account & Applicant Match ($80,000) = 45.7% of total grant request
Applicant Match ($50,000) = 22.2% of total study costs ($225,137)
(refer to *Funding Summary/Matching Funds*)

Staff Recommendation:
Staff recommends approval of up to $30,000 from the Arkansas Basin Account and $145,137 from the Statewide account to help fund the study titled: FIRI Analysis and Tailwater Return Flow Study on Fort Lyon Canal.

Water Activity Summary: The first phase of the study (for which the Applicant is currently seeking funding) will utilize the Farm Irrigation Rating Index (FIRI) method on a canal-wide basis to analyze irrigation efficiency. This analysis will involve extensive data collection and observation pertaining to irrigation management and systems with the goal of establishing more representative canal-wide irrigation efficiency. It will then select a limited number of farms on a single section of the Fort Lyon Canal to provide sufficient data on tailwater return flows.

The goal of the first phase of the Study will be to obtain high-quality data on farm efficiency, pursuant to a FIRI analysis, and on the actual amounts of tailwater return flows occurring from flood-irrigated farms on a subset of the Fort Lyon Canal. The FIRI Analysis and Tailwater Study will enable a better understanding of the farm irrigation efficiency and how tailwater return flows actually accrue to the Arkansas River as compared to the tailwater assumption, an irrigation efficiency factor, contained in the Irrigation System Analysis Model (ISAM). ISAM was developed to provide a standard methodology for performing evaluations as to whether irrigation system improvements result in a reduction or change in the timing or location of historical seepage losses or return flows in violation of Article IV-D of the Arkansas River Compact and to implement the "Compact Rules Governing Improvements to Surface Water Irrigation Systems in the Arkansas River Basin in Colorado" (the "Irrigation Improvements Rules").

ISAM is widely believed to be overly-conservative on water-short ditch systems such as the Fort Lyon Canal. Moreover, it did not consider whether tailwater run-off from one field may actually be utilized on another field within the same farm. A priority of all parties in developing the Irrigation Improvements Rules and the ISAM was to ensure that these rules would not create a disincentive to install irrigation system improvements. However, overly-conservative assumptions in the ISAM can have this effect and can also result in over-delivery of Colorado's water resources to Kansas. A lower tailwater assumption and increased maximum farm irrigation efficiency factor will also have the benefit of increasing the anticipated transferable yield associated with Fort Lyon shares in the context of other water transfers, such as rotational leasing-fallowing projects.

The Study is designed to conserve existing water resources and reduce pressure on existing water supplies, both of which would assist in meeting both the M&I and agricultural water gaps identified in the Arkansas River Basin Consumptive Needs Assessment: 2030 (June 2008). The potential water savings that may result from a lower, more accurate tailwater return flow assumption and increased maximum farm irrigation efficiency factor on the Fort Lyon Canal could reduce the amount of water supplies needed to meet Compact compliance requirements under the Irrigation Improvements Rules, leaving that water available to meet other needs, including M&I needs. Also, by decreasing the costs associated with Compact compliance for irrigation system improvements, the Study could promote further installation of irrigation system improvements and the resultant benefits of increased water efficiency, increased productivity, and improved water quality. Additional transferable yield will similarly be available from temporary (i.e., rotational leasing and fallowing programs) and/or permanent changes to Fort Lyon shares.

Discussion:
No further discussion is required

Issues/Additional Needs:
No issues or additional needs have been identified.

Threshold and Evaluation Criteria:
The application meets all four Threshold Criteria

Tier 1-3 Evaluation Criteria:

Tier 1: (a) The study will address agricultural irrigation efficiency and assist in determining the amount of water needed to meet Arkansas River Compact obligations.

(b) The Lower Ark District will work in close collaboration with Fort Lyon Canal farmers to undertake the first phase of the Study. The study will also involve cooperation and collaboration with the Fort Lyon Canal Company in undertaking the study and the Division 2 Engineer's Office of the Division of Water Resources.

(c) The Tailwater Study is designed to actively and measurably lead to the development of conserved water to meet both the M&I gap and the agricultural gap, as identified in the Arkansas River Basin Consumptive Needs Assessment: 2030 (June 2008).

Tier 2: (d) Without funding from the WSRA, this phase of the Tailwater Study will not be undertaken. Alternate means of funding have been explored but none appear to be available.

(e) The Lower Ark District has demonstrated a significant commitment to the Tailwater Study through matching funds of $50,000.

Tier 3: (f) The anticipated results of the Tailwater Study will help sustain agriculture by ensuring that Fort Lyon farmers continue to have incentives to invest in their operations and install irrigation system improvements. Such investments are needed to ensure the future health and vitality of agricultural communities. Moreover, these irrigation system investments could improve water quality and benefit both the environment and recreation on the Lower Arkansas River.

(g) The Tailwater Study will address problems related to compact-entitled water and compact compliance and promotes maximum utilization of state waters. One of the study's broad aims is to ensure that the accuracy of "return flow maintenance water" calculations pursuant to the Irrigation Improvements Rules such that a violation of the Arkansas River Compact is avoided. The Tailwater Study will provide the data needed to refine the H-I Model and the ISAM in a way that is anticipated to reduce the burdens of Compact compliance on farmers.

(h) n/a

(i) Though not easily quantified because the amount of water saved will ultimately depend on the results of the full study and the rate of sprinkler growth, the data and analysis generated from this phase of the Tailwater Study will provide a high level of benefit. The anticipated reduction in the tailwater assumption and an increase in the maximum farm irrigation efficiency factor on the Fort Lyon is likely to lead to encourage increasing water efficiency and agricultural productively through installation of sprinkler systems on irrigated lands and reductions in return flow obligations under the Arkansas River Compact.

(j) Most immediately, the data and analysis resulting from completion of the full Tailwater Study may be incorporated into the H-I Model and the ISAM and will further the CWCB goals of promoting more efficient use of water while ensuring Compact compliance. It also has the potential to generate data that may be relevant for the Arkansas decision support system.

Funding Summary/Matching Funds:

	Cash	**In-kind**	**Total**
WSRA Arkansas Basin Account	$30,000	n/a	$30,000
WSRA Statewide Account	$145,137	n/a	$145,137
Lower Arkansas Water Conservancy District	$50,000	$0	$50,000
Total Study Costs	**$225,137**	**$0**	**$225,137**

All products, data and information developed as a result of this grant must be provided to the CWCB in hard copy and electronic format as part of the project documentation. This information will in turn be made widely available to Basin Roundtables and the general public and will help promote the development of a common technical platform. In accordance with the revised WSRA Criteria and

Guidelines, staff would like to highlight additional reporting and final deliverable requirements. The specific requirements are provided below.

Reporting: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of the executed contract. The progress report shall describe the completion or partial completion of the tasks identified in the scope of work including a description of any major issues that have occurred and any corrective action taken to address these issues.

Final Deliverable: At completion of the project, the applicant shall provide the CWCB a final report that summarizes the project and documents how the project was completed. This report may contain photographs, summaries of meetings and engineering reports/designs.

Engineering: All engineering work (as defined in the Engineers Practice Act (§12-25-102(10) C.R.S.)) performed under this grant shall be performed by or under the responsible charge of professional engineer licensed by the State of Colorado to practice Engineering.